

SEQUENCE LISTING



<110> Covacci, Antonello
Bugnoli, Massimo
Telford, John
Macchia, Giovanni
Rappuoli, Rino

<120> Helicobacter Pylori Cytotoxin Proteins Useful For
Vaccines And Diagnostics

<130> CHIR0158

<140> 09/360,934

<141> 1999-07-26

<160> 8

<170> PatentIn Ver. 2.1

<210> 1

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
Sequence

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Artificial
Sequence

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<211> 1296

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial Sequence

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Ala	Ala	Phe	Phe	Thr	Thr	Val	Ile	Ile	Pro	Ala	Ile	Val	Gly	Gly	Ile
		35					40					45			

Ala	Thr	Gly	Thr	Ala	Val	Gly	Thr	Val	Ser	Gly	Leu	Leu	Ser	Trp	Gly
	50					55					60				

Leu	Lys	Gln	Ala	Glu	Glu	Ala	Asn	Lys	Thr	Pro	Asp	Lys	Pro	Asp	Lys
65					70					75				80	

Val	Trp	Arg	Ile	Gln	Ala	Gly	Lys	Gly	Phe	Asn	Glu	Phe	Pro	Asn	Lys
			85						90					95	

Glu	Tyr	Asp	Leu	Tyr	Arg	Ser	Leu	Leu	Ser	Ser	Lys	Ile	Asp	Gly	Gly
		100					105					110			

Trp	Asp	Trp	Gly	Asn	Ala	Ala	Arg	His	Tyr	Trp	Val	Lys	Gly	Gly	Gln
	115						120					125			

Gln	Asn	Lys	Leu	Glu	Val	Asp	Met	Lys	Asp	Ala	Val	Gly	Thr	Tyr	Thr		
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Leu	Ser	Gly	Leu	Arg	Asn	Phe	Thr	Gly	Gly	Asp	Leu	Asp	Val	Asn	Met		
145					150					155					160		
Gln	Lys	Ala	Thr	Leu	Arg	Leu	Gly	Gln	Phe	Asn	Gly	Asn	Ser	Phe	Thr		
				165					170					175			
Ser	Tyr	Lys	Asp	Ser	Ala	Asp	Arg	Thr	Thr	Arg	Val	Asp	Phe	Asn	Ala		
			180					185					190				
Lys	Asn	Ile	Ser	Ile	Asp	Asn	Phe	Val	Glu	Ile	Asn	Asn	Arg	Val	Gly		
	195					200						205					
Ser	Gly	Ala	Gly	Arg	Lys	Ala	Ser	Ser	Thr	Val	Leu	Thr	Leu	Gln	Ala		
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Ser	Glu	Gly	Ile	Thr	Ser	Asp	Lys	Asn	Ala	Glu	Ile	Ser	Leu	Tyr	Asp		
225					230					235					240		
Gly	Ala	Thr	Leu	Asn	Leu	Ala	Ser	Ser	Ser	Val	Lys	Leu	Met	Gly	Asn		
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Val	Trp	Met	Gly	Arg	Leu	Gln	Tyr	Val	Gly	Ala	Tyr	Leu	Ala	Pro	Ser		
			260					265					270				
Tyr	Ser	Thr	Ile	Asn	Thr	Ser	Lys	Val	Thr	Gly	Glu	Val	Asn	Phe	Asn		
	275						280					285					
His	Leu	Thr	Val	Gly	Asp	Lys	Asn	Ala	Ala	Gln	Ala	Gly	Ile	Ile	Ala		
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Asn	Lys	Lys	Thr	Asn	Ile	Gly	Thr	Leu	Asp	Leu	Trp	Gln	Ser	Ala	Gly		
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Leu	Asn	Ile	Ile	Ala	Pro	Pro	Glu	Gly	Gly	Tyr	Lys	Asp	Lys	Pro	Asn		
			325						330					335			
Asn	Thr	Pro	Ser	Gln	Ser	Gly	Ala	Lys	Asn	Asp	Lys	Asn	Glu	Ser	Ala		
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Lys	Asn	Asp	Lys	Gln	Glu	Ser	Ser	Gln	Asn	Asn	Ser	Asn	Thr	Gln	Val		
	355						360					365					
Ile	Asn	Pro	Pro	Asn	Ser	Ala	Gln	Lys	Thr	Glu	Val	Gln	Pro	Thr	Gln		
	370					375					380						

Val Ile Asp Gly Pro Phe Ala Gly Gly Lys Asp Thr Val Val Asn Ile
385 390 395 400
Asn Arg Ile Asn Thr Asn Ala Asp Gly Thr Ile Arg Val Gly Gly Phe
405 410 415
Lys Ala Ser Leu Thr Thr Asn Ala Ala His Leu His Ile Gly Lys Gly
420 425 430
Gly Val Asn Leu Ser Asn Gln Ala Ser Gly Arg Ser Leu Ile Val Glu
435 440 445
Asn Leu Thr Gly Asn Ile Thr Val Asp Gly Pro Leu Arg Val Asn Asn
450 455 460
Gln Val Gly Gly Tyr Ala Leu Ala Gly Ser Ser Ala Asn Phe Glu Phe
465 470 475 480
Lys Ala Gly Thr Asp Thr Lys Asn Gly Thr Ala Thr Phe Asn Asn Asp
485 490 495
Ile Ser Leu Gly Arg Phe Val Asn Leu Lys Val Asp Ala His Thr Ala
500 505 510
Asn Phe Lys Gly Ile Asp Thr Gly Asn Gly Gly Phe Asn Thr Leu Asp
515 520 525
Phe Ser Gly Val Thr Asp Lys Val Asn Ile Asn Lys Leu Ile Thr Ala
530 535 540
Ser Thr Asn Val Ala Val Lys Asn Phe Asn Ile Asn Glu Leu Ile Val
545 550 555 560
Lys Thr Asn Gly Ile Ser Val Gly Glu Tyr Thr His Phe Ser Glu Asp
565 570 575
Ile Gly Ser Gln Ser Arg Ile Asn Thr Val Arg Leu Glu Thr Gly Thr
580 585 590
Arg Ser Leu Phe Ser Gly Gly Val Lys Phe Lys Gly Gly Glu Lys Leu
595 600 605
Val Ile Asp Glu Phe Tyr Tyr Ser Pro Trp Asn Tyr Phe Asp Ala Arg
610 615 620
Asn Ile Lys Asn Val Glu Ile Thr Asn Lys Leu Ala Phe Gly Pro Gln
625 630 635 640

Gly	Ser	Pro	Trp	Gly	Thr	Ser	Lys	Leu	Met	Phe	Asn	Asn	Leu	Thr	Leu	645	650	655	
Gly	Gln	Asn	Ala	Val	Met	Asp	Tyr	Ser	Gln	Phe	Ser	Asn	Leu	Thr	Ile	660	665	670	
Gln	Gly	Asp	Phe	Ile	Asn	Asn	Gln	Gly	Thr	Ile	Asn	Tyr	Leu	Val	Arg	675	680	685	
Gly	Gly	Lys	Val	Ala	Thr	Leu	Ser	Val	Gly	Asn	Ala	Ala	Ala	Met	Met	690	695	700	
Phe	Asn	Asn	Asp	Ile	Asp	Ser	Ala	Thr	Gly	Phe	Tyr	Lys	Pro	Leu	Ile	705	710	715	720
Lys	Ile	Asn	Ser	Ala	Gln	Asp	Leu	Ile	Lys	Asn	Thr	Glu	His	Val	Leu	725	730	735	
Leu	Lys	Ala	Lys	Ile	Ile	Gly	Tyr	Gly	Asn	Val	Ser	Thr	Gly	Thr	Asn	740	745	750	
Gly	Ile	Ser	Asn	Val	Asn	Leu	Glu	Glu	Gln	Phe	Lys	Glu	Arg	Leu	Ala	755	760	765	
Leu	Tyr	Asn	Asn	Asn	Asn	Arg	Met	Asp	Thr	Cys	Val	Val	Arg	Asn	Thr	770	775	780	
Asp	Asp	Ile	Lys	Ala	Cys	Gly	Met	Ala	Ile	Gly	Asp	Gln	Ser	Met	Val	785	790	795	800
Asn	Asn	Pro	Asp	Asn	Tyr	Lys	Tyr	Leu	Ile	Gly	Lys	Ala	Trp	Lys	Asn	805	810	815	
Ile	Gly	Ile	Ser	Lys	Thr	Ala	Asn	Gly	Ser	Lys	Ile	Ser	Val	Tyr	Tyr	820	825	830	
Leu	Gly	Asn	Ser	Thr	Pro	Thr	Glu	Asn	Gly	Gly	Asn	Thr	Thr	Asn	Leu	835	840	845	
Pro	Thr	Asn	Thr	Thr	Ser	Asn	Ala	Arg	Ser	Ala	Asn	Asn	Ala	Leu	Ala	850	855	860	
Gln	Asn	Ala	Pro	Phe	Ala	Gln	Pro	Ser	Ala	Thr	Pro	Asn	Leu	Val	Ala	865	870	875	880
Ile	Asn	Gln	His	Asp	Phe	Gly	Thr	Ile	Glu	Ser	Val	Phe	Glu	Leu	Ala	885	890	895	

Asn Arg Ser Lys Asp Ile Asp Thr Leu Tyr Ala Asn Ser Gly Ala Gln		
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Gly Arg Asp Leu Leu Gln Thr Leu Leu Ile Asp Ser His Asp Ala Gly		
915	920	925
Tyr Ala Arg Lys Met Ile Asp Ala Thr Ser Ala Asn Glu Ile Thr Lys		
930	935	940
Gln Leu Asn Thr Ala Thr Thr Thr Leu Asn Asn Ile Ala Ser Leu Glu		
945	950	955 960
His Lys Thr Ser Gly Leu Gln Thr Leu Ser Leu Ser Asn Ala Met Ile		
965	970	975
Leu Asn Ser Arg Leu Val Asn Leu Ser Arg Arg His Thr Asn His Ile		
980	985	990
Asp Ser Phe Ala Lys Arg Leu Gln Ala Leu Lys Asp Gln Lys Phe Ala		
995	1000	1005
Ser Leu Glu Ser Ala Ala Glu Val Leu Tyr Gln Phe Ala Pro Lys Tyr		
1010	1015	1020
Glu Lys Pro Thr Asn Val Trp Ala Asn Ala Ile Gly Gly Thr Ser Leu		
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Asn Asn Gly Ser Asn Ala Ser Leu Tyr Gly Thr Ser Ala Gly Val Asp		
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Ala Tyr Leu Asn Gly Gln Val Glu Ala Ile Val Gly Gly Phe Gly Ser		
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Tyr Gly Tyr Ser Ser Phe Asn Asn Arg Ala Asn Ser Leu Asn Ser Gly		
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Ala Asn Asn Thr Asn Phe Gly Val Tyr Ser Arg Ile Phe Ala Asn Gln		
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His Glu Phe Asp Phe Glu Ala Gln Gly Ala Leu Gly Ser Asp Gln Ser		
1105	1110	1115 1120
Ser Leu Asn Phe Lys Ser Ala Leu Leu Gln Asp Leu Asn Gln Ser Tyr		
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His Tyr Leu Ala Tyr Ser Ala Ala Thr Arg Ala Ser Tyr Gly Tyr Asp		
1140	1145	1150

Phe Ala Phe Phe Arg Asn Ala Leu Val Leu Lys Pro Ser Val Gly Val
 1155 1160 1165

Ser Tyr Asn His Leu Gly Ser Thr Asn Phe Lys Ser Asn Ser Thr Asn
 1170 1175 1180

Gln Val Ala Leu Lys Asn Gly Ser Ser Ser Gln His Leu Phe Asn Ala
 1185 1190 1195 1200

Ser Ala Asn Val Glu Ala Arg Tyr Tyr Tyr Gly Asp Thr Ser Tyr Phe
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Tyr Met Asn Ala Gly Val Leu Gln Glu Phe Ala His Val Gly Ser Asn
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Asn Ala Ala Ser Leu Asn Thr Phe Lys Val Asn Ala Ala Arg Asn Pro
 1235 1240 1245

Leu Asn Thr His Ala Arg Val Met Met Gly Gly Glu Leu Lys Leu Ala
 1250 1255 1260

Lys Glu Val Phe Leu Asn Leu Gly Val Val Tyr Leu His Asn Leu Ile
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Ser Asn Ile Gly His Phe Ala Ser Asn Leu Gly Met Arg Tyr Ser Phe
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<211> 5925

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
 Sequence

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<210> 5

<211> 1147

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
Sequence

<400> 5

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		20						25					30		

Asp	Asn	Ala	Val	Ala	Ser	Tyr	Asp	Pro	Asp	Gln	Lys	Pro	Ile	Val	Asp
		35					40					45			

Lys	Asn	Asp	Arg	Asp	Asn	Arg	Gln	Ala	Phe	Glu	Gly	Ile	Ser	Gln	Leu
	50					55					60				

Arg	Glu	Glu	Tyr	Ser	Asn	Lys	Ala	Ile	Lys	Asn	Pro	Thr	Lys	Lys	Asn
65					70					75					80

Gln	Tyr	Phe	Ser	Asp	Phe	Ile	Asn	Lys	Ser	Asn	Asp	Leu	Ile	Asn	Lys
				85					90					95	

Asp	Asn	Leu	Ile	Asp	Val	Glu	Ser	Ser	Thr	Lys	Ser	Phe	Gln	Lys	Phe
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Gly	Asp	Gln	Arg	Tyr	Arg	Ile	Phe	Thr	Ser	Trp	Val	Ser	His	Gln	Asn
		115					120					125			

Asp	Pro	Ser	Lys	Ile	Asn	Thr	Arg	Ser	Ile	Arg	Asn	Phe	Met	Glu	Asn
	130					135					140				

Ile	Ile	Gln	Pro	Pro	Ile	Leu	Asp	Asp	Lys	Glu	Lys	Ala	Glu	Phe	Leu
145					150					155					160

Lys	Ser	Ala	Lys	Gln	Ser	Phe	Ala	Gly	Ile	Ile	Ile	Gly	Asn	Gln	Ile
				165					170					175	

Arg	Thr	Asp	Gln	Lys	Phe	Met	Gly	Val	Phe	Asp	Glu	Ser	Leu	Lys	Glu
			180					185					190		

Arg	Gln	Glu	Ala	Glu	Lys	Asn	Gly	Glu	Pro	Thr	Gly	Gly	Asp	Trp	Leu
		195					200					205			

Asp	Ile	Phe	Leu	Ser	Phe	Ile	Phe	Asp	Lys	Lys	Gln	Ser	Ser	Asp	Val	210	215	220	
Lys	Glu	Ala	Ile	Asn	Gln	Glu	Pro	Val	Pro	His	Val	Gln	Pro	Asp	Ile	225	230	235	240
Ala	Thr	Thr	Thr	Thr	Asp	Ile	Gln	Gly	Leu	Pro	Pro	Glu	Ala	Arg	Asp	245	250	255	
Leu	Leu	Asp	Glu	Arg	Gly	Asn	Phe	Ser	Lys	Phe	Thr	Leu	Gly	Asp	Met	260	265	270	
Glu	Met	Leu	Asp	Val	Glu	Gly	Val	Ala	Asp	Ile	Asp	Pro	Asn	Tyr	Lys	275	280	285	
Phe	Asn	Gln	Leu	Leu	Ile	His	Asn	Asn	Ala	Leu	Ser	Ser	Val	Leu	Met	290	295	300	
Gly	Ser	His	Asn	Gly	Ile	Glu	Pro	Glu	Lys	Val	Ser	Leu	Leu	Tyr	Gly	305	310	315	320
Gly	Asn	Gly	Gly	Pro	Gly	Ala	Arg	His	Asp	Trp	Asn	Ala	Thr	Val	Gly	325	330	335	
Tyr	Lys	Asp	Gln	Gln	Gly	Asn	Asn	Val	Ala	Thr	Ile	Ile	Asn	Val	His	340	345	350	
Met	Lys	Asn	Gly	Ser	Gly	Leu	Val	Ile	Ala	Gly	Gly	Glu	Lys	Gly	Ile	355	360	365	
Asn	Asn	Pro	Ser	Phe	Tyr	Leu	Tyr	Lys	Glu	Asp	Gln	Leu	Thr	Gly	Ser	370	375	380	
Gln	Arg	Ala	Leu	Ser	Gln	Glu	Glu	Ile	Gln	Asn	Lys	Ile	Asp	Phe	Met	385	390	395	400
Glu	Phe	Leu	Ala	Gln	Asn	Asn	Ala	Lys	Leu	Asp	Asn	Leu	Ser	Glu	Lys	405	410	415	
Glu	Lys	Glu	Lys	Phe	Arg	Thr	Glu	Ile	Lys	Asp	Phe	Gln	Lys	Asp	Ser	420	425	430	
Lys	Ala	Tyr	Leu	Asp	Ala	Leu	Gly	Asn	Asp	Arg	Ile	Ala	Phe	Val	Ser	435	440	445	
Lys	Lys	Asp	Thr	Lys	His	Ser	Ala	Leu	Ile	Thr	Glu	Phe	Gly	Asn	Gly	450	455	460	

Asp	Leu	Ser	Tyr	Thr	Leu	Lys	Asp	Tyr	Gly	Lys	Lys	Ala	Asp	Lys	Ala	
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Leu	Asp	Arg	Glu	Lys	Asn	Val	Thr	Leu	Gln	Gly	Ser	Leu	Lys	His	Asp	
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Gly	Val	Met	Phe	Val	Asp	Tyr	Ser	Asn	Phe	Lys	Tyr	Thr	Asn	Ala	Ser	
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Lys	Asn	Pro	Asn	Lys	Gly	Val	Gly	Val	Thr	Asn	Gly	Val	Ser	His	Leu	
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Glu	Val	Gly	Phe	Asn	Lys	Val	Ala	Ile	Phe	Asn	Leu	Pro	Asp	Leu	Asn	
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Asn	Leu	Ala	Ile	Thr	Ser	Phe	Val	Arg	Arg	Asn	Leu	Glu	Asp	Lys	Leu	
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Thr	Thr	Lys	Gly	Leu	Ser	Pro	Gln	Glu	Ala	Asn	Lys	Leu	Ile	Lys	Asp	
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Phe	Leu	Ser	Ser	Asn	Lys	Glu	Leu	Val	Gly	Lys	Thr	Leu	Asn	Phe	Asn	
			580					585					590			
Lys	Ala	Val	Ala	Asp	Ala	Lys	Asn	Thr	Gly	Asn	Tyr	Asp	Glu	Val	Lys	
		595					600					605				
Lys	Ala	Gln	Lys	Asp	Leu	Glu	Lys	Ser	Leu	Arg	Lys	Arg	Glu	His	Leu	
	610					615					620					
Glu	Lys	Glu	Val	Glu	Lys	Lys	Leu	Glu	Ser	Lys	Ser	Gly	Asn	Lys	Asn	
625					630					635				640		
Lys	Met	Glu	Ala	Lys	Ala	Gln	Ala	Asn	Ser	Gln	Lys	Asp	Glu	Ile	Phe	
				645					650					655		
Ala	Leu	Ile	Asn	Lys	Glu	Ala	Asn	Arg	Asp	Ala	Arg	Ala	Ile	Ala	Tyr	
			660					665					670			
Ala	Gln	Asn	Leu	Lys	Gly	Ile	Lys	Arg	Glu	Leu	Ser	Asp	Lys	Leu	Glu	
		675					680					685				
Asn	Val	Asn	Lys	Asn	Leu	Lys	Asp	Phe	Asp	Lys	Ser	Phe	Asp	Glu	Phe	
	690					695					700					
Lys	Asn	Gly	Lys	Asn	Lys	Asp	Phe	Ser	Lys	Ala	Glu	Glu	Thr	Leu	Lys	
705					710					715				720		

Ala	Leu	Lys	Gly	Ser	Val	Lys	Asp	Leu	Gly	Ile	Asn	Pro	Glu	Trp	Ile		
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Ser	Lys	Val	Glu	Asn	Leu	Asn	Ala	Ala	Leu	Asn	Glu	Phe	Lys	Asn	Gly		
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Lys	Asn	Lys	Asp	Phe	Ser	Lys	Val	Thr	Gln	Ala	Lys	Ser	Asp	Leu	Glu		
		755					760					765					
Asn	Ser	Val	Lys	Asp	Val	Ile	Ile	Asn	Gln	Lys	Val	Thr	Asp	Lys	Val		
	770					775						780					
Asp	Asn	Leu	Asn	Gln	Ala	Val	Ser	Val	Ala	Lys	Ala	Thr	Gly	Asp	Phe		
785					790					795					800		
Ser	Arg	Val	Glu	Gln	Ala	Leu	Ala	Asp	Leu	Lys	Asn	Phe	Ser	Lys	Glu		
				805					810					815			
Gln	Leu	Ala	Gln	Gln	Ala	Gln	Lys	Asn	Glu	Ser	Leu	Asn	Ala	Arg	Lys		
			820					825					830				
Lys	Ser	Glu	Ile	Tyr	Gln	Ser	Val	Lys	Asn	Gly	Val	Asn	Gly	Thr	Leu		
		835					840					845					
Val	Gly	Asn	Gly	Leu	Ser	Gln	Ala	Glu	Ala	Thr	Thr	Leu	Ser	Lys	Asn		
	850					855					860						
Phe	Ser	Asp	Ile	Lys	Lys	Glu	Leu	Asn	Ala	Lys	Leu	Gly	Asn	Phe	Asn		
865					870					875					880		
Asn	Asn	Asn	Asn	Asn	Gly	Leu	Lys	Asn	Glu	Pro	Ile	Tyr	Ala	Lys	Val		
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Asn	Lys	Lys	Lys	Ala	Gly	Gln	Ala	Ala	Ser	Leu	Glu	Glu	Pro	Ile	Tyr		
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Ala	Gln	Val	Ala	Lys	Lys	Val	Asn	Ala	Lys	Ile	Asp	Arg	Leu	Asn	Gln		
		915					920					925					
Ile	Ala	Ser	Gly	Leu	Gly	Val	Val	Gly	Gln	Ala	Ala	Gly	Phe	Pro	Leu		
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Lys	Arg	His	Asp	Lys	Val	Asp	Asp	Leu	Ser	Lys	Val	Gly	Leu	Ser	Arg		
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Asn	Gln	Glu	Leu	Ala	Gln	Lys	Ile	Asp	Asn	Leu	Asn	Gln	Ala	Val	Ser		
			965					970						975			

Glu Ala Lys Ala Gly Phe Phe Gly Asn Leu Glu Gln Thr Ile Asp Lys
980 985 990

Leu Lys Asp Ser Thr Lys His Asn Pro Met Asn Leu Trp Val Glu Ser
995 1000 1005

Ala Lys Lys Val Pro Ala Ser Leu Ser Ala Lys Leu Asp Asn Tyr Ala
1010 1015 1020

Thr Asn Ser His Ile Arg Ile Asn Ser Asn Ile Lys Asn Gly Ala Ile
1025 1030 1035 1040

Asn Glu Lys Ala Thr Gly Met Leu Thr Gln Lys Asn Pro Glu Trp Leu
1045 1050 1055

Lys Leu Val Asn Asp Lys Ile Val Ala His Asn Val Gly Ser Val Pro
1060 1065 1070

Leu Ser Glu Tyr Asp Lys Ile Gly Phe Asn Gln Lys Asn Met Lys Asp
1075 1080 1085

Tyr Ser Asp Ser Phe Lys Phe Ser Thr Lys Leu Asn Asn Ala Val Lys
1090 1095 1100

Asp Thr Asn Ser Gly Phe Thr Gln Phe Leu Thr Asn Ala Phe Ser Thr
1105 1110 1115 1120

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1125 1130 1135

Asn Val Asn Thr Lys Gly Gly Phe Gln Lys Ser
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<210> 6

<211> 546

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
Sequence

<400> 6

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35	40	45
Thr Lys Asp Gly Val Ser Val Ala Lys Glu Ile Glu Leu Ser Cys Pro		
50	55	60
Val Ala Asn Met Gly Ala Gln Leu Val Lys Glu Val Ala Ser Lys Thr		
65	70	75
Ala Asp Ala Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala Tyr		
85	90	95
Ser Ile Phe Lys Glu Gly Leu Arg Asn Ile Thr Ala Gly Ala Asn Pro		
100	105	110
Ile Glu Val Lys Arg Gly Met Asp Lys Ala Ala Glu Ala Ile Ile Asn		
115	120	125
Glu Leu Lys Lys Ala Ser Lys Lys Val Gly Gly Lys Glu Glu Ile Thr		
130	135	140
Gln Val Ala Thr Ile Ser Ala Asn Ser Asp His Asn Ile Gly Lys Leu		
145	150	155
Ile Ala Asp Ala Met Glu Lys Val Gly Lys Asp Gly Val Ile Thr Val		
165	170	175
Glu Glu Ala Lys Gly Ile Glu Asp Glu Leu Asp Val Val Glu Gly Met		
180	185	190
Gln Phe Asp Arg Gly Tyr Leu Ser Pro Tyr Phe Val Thr Asn Ala Glu		
195	200	205
Lys Met Thr Ala Gln Leu Asp Asn Ala Tyr Ile Leu Leu Thr Asp Lys		
210	215	220
Lys Ile Ser Ser Met Lys Asp Ile Leu Pro Leu Leu Glu Lys Thr Met		
225	230	235
Lys Glu Gly Lys Pro Leu Leu Ile Ile Ala Glu Asp Ile Glu Gly Glu		
245	250	255
Ala Leu Thr Thr Leu Val Val Asn Lys Leu Arg Gly Val Leu Asn Ile		
260	265	270
Ala Ala Val Lys Ala Pro Gly Phe Gly Asp Arg Arg Lys Glu Met Leu		

275		280		285
Lys Asp Ile Ala Ile Leu Thr Gly Gly Gln Val Ile Ser Glu Glu Leu				
290		295		300
Gly Leu Ser Leu Glu Asn Ala Glu Val Glu Phe Leu Gly Lys Ala Gly				
305		310		315
				320
Arg Ile Val Ile Asp Lys Asp Asn Thr Thr Ile Val Asp Gly Lys Gly				
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				335
His Ser Asp Asp Val Lys Asp Arg Val Ala Gln Ile Lys Thr Gln Ile				
		340		345
				350
Ala Ser Thr Thr Ser Asp Tyr Asp Lys Glu Lys Leu Gln Glu Arg Leu				
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Ala Lys Leu Ser Gly Gly Val Ala Val Ile Lys Val Gly Ala Ala Ser				
		370		375
				380
Glu Val Glu Met Lys Glu Lys Lys Asp Arg Val Asp Asp Ala Leu Ser				
		385		390
				395
				400
Ala Thr Lys Ala Ala Val Glu Glu Gly Ile Val Ile Gly Gly Gly Ala				
		405		410
				415
Ala Leu Ile Arg Ala Ala Gln Lys Val His Leu Asn Leu His Asp Asp				
		420		425
				430
Glu Lys Val Gly Tyr Glu Ile Ile Met Arg Ala Ile Lys Ala Pro Leu				
		435		440
				445
Ala Gln Ile Ala Ile Asn Ala Gly Tyr Asp Gly Gly Val Val Val Asn				
		450		455
				460
Glu Val Glu Lys His Glu Gly His Phe Gly Phe Asn Ala Ser Asn Gly				
		465		470
				475
				480
Lys Tyr Val Asp Met Phe Lys Glu Gly Ile Ile Asp Pro Leu Lys Val				
		485		490
				495
Glu Arg Ile Ala Leu Gln Asn Ala Val Ser Val Ser Ser Leu Leu Leu				
		500		505
				510
Thr Thr Glu Ala Thr Val His Glu Ile Lys Glu Glu Lys Ala Thr Pro				
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Ala Met Pro Asp Met Gly Gly Met Gly Gly Met Gly Gly Met Gly Gly				

530

535

540

Met Met

545

<210> 7

<211> 1838

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
Sequence

<400> 7

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<210> 8
<211> 18
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Artificial
Sequence

<400> 8
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18

B1
cont